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ABDOMINAL CIRCUMFERENCE AND RISK OF MUSCULOSKELETAL INJURY

Multiple studies demonstrate that obesity is associated with the risk of musculoskeletal injuries. While most studies have focused on obesity as identified by the body mass index (BMI), few have considered other measures of obesity, including abdominal circumference. This study compared abdominal circumference (AC) and BMI as means to estimate the risk of musculoskeletal injury.

This prospective cohort study evaluated the time to first musculoskeletal injury among all active duty United States Air Force (USAF) members from January of 2005 through December of 2011. During routine fitness testing, biometric data were gathered, including height, weight and AC. The main outcome measure was any new diagnosis of musculoskeletal injury in the medical record. The rate of injury was compared by BMI and AC.

Of the subjects, 11.2% were obese and 51.7% overweight. Using the USAF criteria for AC risk, low risk (males <=35 inches; females <=32 inches), moderate risk (males >35 but <=39 inches; females >32 but <=36 inches), and high risk (males >39 inches; females >36 inches), 69.5% were low risk, 27.8% moderate risk and 2.7% high risk. The results revealed an overall injury rate of 67.6% during the study period. Among obese individuals, the injury rate was 74.3%, compared with 60.1% for overweight and 64.8% for normal weight subjects. Using AC, the injury rate was 88.5% for the high-risk, 72% for the moderate risk and 64.9% for the low risk groups.

Conclusion: This study of United States Air Force personnel found that abdominal circumference may be a better determinant of musculoskeletal injury risk than is body mass index.

Nye, N., et al. Abdominal Circumference is Superior to Body Mass Index in Estimating Musculoskeletal Injury Risk. **Med Sci in Sports Exer.** 2014, October; 11:1951-1959.

ADVANCED CRYOTHERAPY AFTER KNEE ARTHROPLASTY

Despite pain management advances in anesthetic techniques, total knee arthroplasty (TKA) remains a challenging procedure for most patients. Cryotherapy, the application of cold to skin surrounding the injured soft tissues, is designed to reduce intra-articular pressure and decrease the local inflammatory reaction. This study was designed to determine whether advanced cryotherapy techniques could produce better post-operative pain control.

This randomized, controlled trial included 116 patients undergoing primary TKA. The subjects were quasi-randomized to receive advanced cryotherapy (AC) or traditional cold packs. The AC group received four hours of continuous cooling at 11°C immediately after surgery, as needed during the night after surgery and for four hours the following day. The control group received 15 minutes of cold pack treatment upon arrival in the recovery room, and again upon arrival in the ward. This treatment was repeated at two hours and four hours post- surgery. On the following days, the patients received the same therapy 15 minutes after physical therapy sessions at 11:00 a.m. and 3:00 p.m. The primary outcome measures were a visual analogue scale of pain at rest and analgesics consumed, with secondary outcomes including postoperative ROM, swelling and blood loss.

No significant differences were observed between the treatment and control groups in pain scores at rest. Further, no significant between group differences in pain scores were noted on day two, and none were found for pain medication consumption or length of stay. Functional results at six weeks were equivalent between groups.

Conclusion: This study of patients undergoing knee arthroplasty did not find that continuous cooling after surgery is superior to traditional cold packs for reducing pain or improving function.

Thienpoint, E., et al. Does Advanced Cryotherapy Reduce Pain and Narcotic Consumption after Knee Arthroplasty? **Clinical Orthopedics and Related Research**. 2014, November; 472 (11): 3417-3423.

EFFECT OF EXERCISE ON SLEEP AND FATIGUE IN PATIENTS WITH RHEUMATOID ARTHRITIS

Sleep disturbance is a common complaint among patients with rheumatoid arthritis (RA). Multiple factors have been associated with this phenomenon, including pain, depression, lack of exercise, restless legs, and corticosteroid use. This study evaluated the effect of exercise on self-reported sleep quality and fatigue among patients with RA.

Seventy patients diagnosed with RA were recruited from an outpatient rheumatology clinic. The patients were randomized to receive standard care, with information regarding the benefits

of exercise, or standard care plus a 12-week home exercise program. The exercise program included resistance training, a walking program (developed according to the American College of Sports Medicine guidelines) and a daily flexibility program. Those in the exercise group were assessed at baseline and every three weeks, while the control group was assessed at baseline and at 12 weeks. Participants were evaluated using the Health Assessment Questionnaire Disability Index, for pain and stiffness using a visual analogue scale, for fatigue using the Fatigue Severity Scale and for sleep quality using the Pittsburgh Sleep Quality Index. The primary outcome measure was sleep improvement.

Forty participants were included in the analysis. In both groups, the most commonly reported statement regarding fatigue and quality-of-life was, "Fatigue is among my three most disabling symptoms." The second most common statement was, "I can easily fatigue." Compared to the control group, significantly greater improvements were noted for the intervention group in pain (p=0.05), stiffness (p=0.05), subjective sleep quality (p=0.04) and Fatigue Severity Scale scores (p=0.04).

Conclusion: This study of patients with rheumatoid arthritis demonstrates that an exercise program including resistance, cardiovascular exercise and stretching can significantly affect fatigue and sleep quality.

Durcan, L., et al. Effect of Exercise on Sleep and Fatigue in Rheumatoid Arthritis: A Randomized, Controlled Study. **J Rheum.** 2014, October; 41 (10): 1966-1973.

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION IN THE UNITED STATES

Anterior cruciate ligament (ACL) injury is one of the most extensively studied musculoskeletal conditions. The true incidence of ACL construction the United States is currently unknown. This study was designed to determine the incidence of ACL reconstruction in the United States, and to identify changes in this incidence between 1994 and 2006.

Using data from the National Hospital Discharge Survey and the National Survey of Ambulatory Surgery, the authors identified patients who had undergone ACL reconstruction in the United States. Data were extracted included location of procedure, age, gender and diagnoses. From these data the ACL reconstruction incidences in 1994 and in 2006 were calculated.

When corrected for population changes, the number of ACL reconstruction procedures rose from 32.94 per 100,000 person-years in 1994 to 43.48 per 100,000 person- years in 2006 (p=0.015). The number of ACL reconstructions performed in the United States for patients younger than 20 years increased from 12.22 per 100,000 person-years in 1994 to 17.97 per 100,000 person-years in 2006. In addition, the number of ACL reconstructions performed in those 40 .65 per 100,000 person-years in 1994 to 7.57 per 100,000 person-years in 2006 The number of reconstructions performed in females increased from 32% in 1994 to 42% in 2006.

Conclusion: This study found that the incidence of ACL reconstruction increased between 1994 and 2006, with significant increases occurring in females, those younger than 20 years and those older than 40 years of age.

Mall, N., et al. Incidence and Trends of Anterior Cruciate Ligament Reconstruction in the United States. **Am J Sports Med.** 2014, October; 42 (10): 2363-2370.

AUDIOVISUAL MANIFESTATIONS OF PSORIATIC ARTHRITIS

Sensorineural hearing loss (SNHL) and acute audiovestibular dysfunction are known to occur in individuals with rheumatic diseases. However, little is known about the auditory manifestations in patients with psoriatic arthritis (PsA). This study examined whether the frequency of sensorineural hearing loss is increased among patients with psoriatic arthritis.

This study comprised 60 patients with PsA and 60 matched controls. Audiologic and vestibular assessments were performed to assess for speech reception threshold, sensorineural hearing loss and computerized dynamic posturography. Associations between audiovestibular tests and epidemiological and clinical features were determined.

Subjective hearing loss occurred in 31.7% of PsA and in 6.7% of controls (p = 0.001) In addition, the frequency of other symptoms such as tinnitus, vertigo dizziness, and disequilibrium was significantly increased in patients with PsA when compared to matched controls (p < 0.001 for all comparisons) Of the patients with PsA, 60% demonstrated abnormal hearing loss, as compared to 8.3% of the controls (p < 0.001). Audiometric tests demonstrated symmetric sensorineuronal hearing loss (SNHL) as the predominant pattern. Patients with PsA experienced abnormal oculocephalic responses, increased frequency of abnormal caloric test results and abnormal computerized dynamic posturography, as compared to controls (p=0.006, p<0.001 and p<0.001, respectively).

Conclusion: This study found strong evidence of inner ear compromise in patients with psoriatic arthritis.

Amor-Dorado, J., et al. Investigations into Audiovestibular Manifestations in Patients with Psoriatic Arthritis. **J Rheum.** 2014, October; 41(10): 2018-2026.

CARBOHYDRATE GEL BEFORE PROLONGED EXERCISE

Previous studies concerning

carbohydrate ingestion prior to exercise have produced inconsistent results. This study compared the effects of carbohydrate gel ingestion at varying times before the onset of exercise.

Four trials, involving seven male triathletes, were conducted in random order, separated by seven days. These trials involved placebo ingestion immediately before exercise, carbohydrate ingestion immediately before exercise (C0), carbohydrate ingestion 45 minutes before exercise (C45) or carbohydrate ingestion 120 minutes before exercise (C120). The carbohydrate gel included maltodrextrin 45 g, with a total caloric value of 180 kcal. The exercise protocol comprised 20 successive sets of four-minute bouts of exercise at up to 80% of VO2 max. Venous blood samples were collected every four minutes throughout the exercise.

Blood glucose concentrations were higher in the C0 trial from 8-80 minutes than in the other trials ($p<0.05$). The average rating of perceived exertion over 0 to 40 minutes were similar between the trials. However over 40 to 80 minutes of exercise the rate of perceived exertion was significantly lower in the C0 and the C120 trials than in the placebo trial.

Conclusion: This study found that carbohydrate ingestion immediately before exercise results in higher glucose concentrations and lower perceived exertion over the final 40 minutes of exercise.

Kohara, A, et al. Carbohydrate Gel Ingestion Immediately before Prolonged Exercise Causes Sustained Higher Glucose Concentrations and Lower Fatigue. **Inter J Sport Health Sci**. 2014; 12: 24-30.

DIAGNOSING PERIPROSTHETIC JOINT INFECTION

Periprosthetic joint infection accounts for 25% of failed knee arthroplasties and 15% of failed hip arthroplasties. This study evaluated the diagnostic characteristics of synovial fluid biomarkers as a means to detect postoperative periprosthetic joint infection.

This prospective study included 95 patients undergoing 66 arthroplasties, believed to be aseptic failures, and 29 arthroplasties diagnosed as periprosthetic joint infection. Among those with periprosthetic joint infection, 23 were culture positive and six were culture negative. Synovial fluid was taken to assess for 43 biomarkers. The sensitivity and specificity of each biomarker was calculated at various thresholds for correct test results. Biomarkers were compared for ability to predict the diagnosis of infection, as defined by the Musculoskeletal Infection Society (MSIS).

Five biomarkers correctly predicted a periprosthetic joint infection. These biomarkers had a sensitivity of 100% and a specificity of 100%. These predictors included α- defensin, ELA-2, BPI, lactoferrin, and NGAL. No significant relationship was seen between these biomarkers and synovial fluid white blood cell count.

Conclusion: This study evaluated potential biomarkers for diagnosing periprosthetic infection after joint replacement surgery, finding five which have 100% sensitivity and specificity for identifying these infections.

Deirmengian, C., et al. Diagnosing Periprosthetic Joint Infection. Has The Era of the Biomarker Arrived? **Clin Ortho Related Research.** 2014, November; 472(11): 3254-3262

EFFECT OF LUMBAR SURGERY ONLUMBOSACRAL NERVE ROOTS

Since the 1970s, pedicle screw instrumentation for the spine has been widely used to treat various pathologic conditions, including degenerative disease, trauma, tumors and deformity.

Reported postoperative neurologic deficit rates after this procedure range from one to 11%. This study evaluated the path of physiologic effects of lumbar instrumentation on lumbosacral nerve roots in the vertebral foramen.

This study included 18 patients with L4 degenerative spondylolisthesis with lumbar spinal canal stenosis at the L3–L4 and L4–L5 segments. The patients underwent L3–L4 and L4–L5 laminotomy with L4–L5 posteriorlateral fusion (PLF) Local pressure was measured before and after surgery, with the spine in neutral and in extension.

At the L4 -5 vertebral foramen, the average pressures with the spine neutral and extension postures ere

29.74 and 51.57 mmHg before fixation and 39.13 and 41.71 mmHg after fixation, respectively ($p<0.001$ for presurgery only). At L-5-S1, these values were 26.91 and 54.36 before fixation and 24.82 and 58.46 after fixation ($p<0.001$ for both).

Conclusion: This study demonstrates that, after lumbar instrumentation, higher external dynamic stresses may occur in nerve roots caudal to fixed segments, while nerve roots in fixed segments experience less external dynamic stresses with positional changes.

Morishita, Y., et al. Pathophysiologic Effects of Lumbar Instrumentation Surgery on Lumbosacral Nerve Roots in the Vertebral Foramen. **Spine.** 2014, October; 39(21): E1256-E1260.

EXERCISE TO REDUCE SURGERY IN SUBACROMIAL PAIN

While subacromial pain is common, there is no consensus concerning the ideal program for treating its symptoms. This study examined whether a specific exercise program can reduce surgical intervention for patients with rotator cuff tears.

Ninety- seven patients with clinical signs of subacromial pain, but not of major rotator cuff tear, were studied. All were on a waiting list for arthroscopic subacromial decompression surgery, and all had complained of lateral shoulder pain of at least six months' duration. At inclusion, all patients received a subacromial corticosteroid injection. The subjects were then randomized to one of two exercise programs. The treatment program performed eccentric exercises for the rotator cuff, along with a combination of concentric and eccentric exercises for the scapular stabilizers. The control program included six active movements for the neck and shoulder without any load or progression. The primary outcome measures were the Constant Murley (C-M) score and the decision to accept surgical intervention after

treatment completion. Secondary outcomes included the Disability of the Arm, Shoulder and Hand Questionnaire, a visual analogue scale for pain and health related quality of life, assessed with the EuroQual instrument.

Ninety-five patients were assessed at one-year follow-up. C-M scores revealed significant improvement between three months and one year. Similar findings were noted for all secondary outcomes. Significantly more patients in the control group than in the exercise group decided to undergo surgery following treatment completion (63% versus 24%).

Conclusion: This study of patients scheduled for arthroscopic subacromial decompressive surgery found that an exercise program consisting of concentric and eccentric exercises with progressive loads can significantly reduce the incidence of surgery.

Hallgren, H., et al. A Specific Exercise Strategy Reduced the Need for Surgery in Subacromial Pain Patients. **Br J Sports Med**. 2014, October; 48(19): 1431-1436.

GLUCOCORTICOIDS AND ION-CHANNEL-MEDIATED TOXICITY

The cellular and molecular mechanisms underlying rotator cuff tendon degeneration have included both intrinsic tendon failure and mechanical impingement. The neuronal changes in tendinopathy appear consistent with a failed healing response and an upregulation in the excitatory, glutanimergic system. This study was designed to further understand the histological and immunohistochemical effects of glucocorticoid injections on rotator cuff tendons.

Supraspinatus tendon biopsies were taken from eight patients undergoing rotator cuff repair, and from 12 patients undergoing subacromial glucocorticoid injection for rotator cuff tendinopathy. For those in the injection group, biopsies were taken before and after injection. For those in the surgery group, biopsies were taken at the time of surgery and at seven weeks post- surgery. Patients in the injection group received one ultrasound guided injection of 40 mg of Depo-Medrol and 4 mL of 2% lignocaine into the subacromial bursa. Biopsies were assessed for histology and immunohistochemistry.

A significant increase in nuclei count and vascularity was noted after rotator cuff repair, although not after glucocorticoid injection ($p=0.008$ for both comparisons). In addition, hypoxia inducible factor I alpha and cell proliferation were increased after rotator cuff repair, and not after glucocorticoid injection. The N-methyl-D aspartame receptor -1 glutamate receptor was increased after glucocorticoid injection and not after rotator cuff repair. An increase in the receptor metabotropic glutamate receptor seven was noted, but only seen after the rotator cuff repair ($p=0.016$).

Conclusion: This study of patients with rotator cuff tears or rotator cuff tendinopathy found that, after steroid injection, indicators of proliferative healing response were absent in a glucocorticoid treated group, with increases in glutamate receptor NMDAR 1 after steroid injection suggesting excytotoxic tendon damage.

Dean, B., et al. Glucocorticoids Induce Specific Ion-Channel-Mediated Toxicity in Human Rotator Cuff Tendon: A Mechanism Underpinning the Ultimate Deleterious Effect of Steroid Injection in Tendinopathy? **Br J Sports Med.** 2014, December; 48 (22): 1620-1626.

LAYLA AND CELECOXIB FOR KNEE OSTEOARTHRITIS

While nonsteroidal anti-inflammatory drugs are known to improve symptoms of osteoarthritis (OA), they also have cautionary side effects. PG 201, (Layla), is an ethanol extract of 12 plant sources, all with known disease modifying characteristics. This study compared the efficacy of celecoxib with that of Layla for the treatment of symptomatic knee OA

This randomized, double-blind, controlled trial included 309 patients ages 14 to 80 years with symptomatic knee OA. At baseline, the subjects were screened by physical examination, including a visual analogue scale for pain, as well as by WOMAC scores and laboratory profiles. The participants were randomized to receive either Layla at 600 mg once per day or celecoxib at 200 mg twice per day for eight weeks. The patients were followed at four and eight weeks after medication onset. At study end, all underwent laboratory profiling. Visual analogue scale scores improved for the Layla group from 65.7 at baseline to 46.9 at week four, and 36.6 at week eight. In the celecoxib group, pain improved from 64.3 at baseline to 42.3 at week four, and 37.9 at week eight. The placebo group had no improvement in pain scores. Both groups demonstrated significant improvements in pain scores, with no differences noted between the two groups. No significant difference was noted between the groups in the tolerability profile of the medication.

Conclusion: This study of patients with osteoarthritis demonstrates that both celecoxib and Layla are effective in reducing pain, with no significant difference between the groups in efficacy or side effects.

Yoo, W.-H., et al. Efficacy and Safety of PG201 (Layla) and Celecoxib in the Treatment of Symptomatic Knee Osteoarthritis: A Double-Blind, Randomized, Multicenter, Active Drug Comparative, Parallel Group, Noninferiority, Phase 3 Study. **Rheum Internat.** 2014, October; 34:1369-1378.

HIP AND CORE VERSUS KNEE MUSCLE STRENGTHENING FOR PATELLOFEMORAL PAIN

Treatment of patellofemoral pain (PFP) has traditionally focused on the quadriceps, suggesting that an imbalance between the vastus medialis oblique and the vastus lateralis can lead to increased PFP. More recently, PFP was proposed to be related to reduced hip strength and core endurance. This study compared the efficacy of a hip and core focused, versus a knee focused, rehabilitation protocol for the treatment of PFP.

This single-blind, multicenter,

randomized, controlled trial involved 199 patients with PFP of at least four weeks duration. Those in the hip protocol group received progressive core strengthening and balance exercises targeting the core. Those in the knee protocol underwent knee focused exercises. The subjects were asked to repeat the exercises five times per week. At six weeks, treatment success was defined as a minimum of a 2 cm improvement on the visual analogue scale (VAS) for pain and a minimum of an eight-point increase on the Anterior Knee Pain Scale (AKPS).

Both groups achieved significant improvements on both the VAS and AKPS, as compared with baseline. However, those in the hip protocol had a significant reduction in self-reported pain starting at week three, while those in the knee protocol had a significant reduction starting at week four.

Conclusion: This study of patients with patellofemoral pain found that both hip and core exercises and knee focused exercises can improve pain and function, although hip and core exercises resulted in an earlier resolution of pain.

Ferber, R., et al. Strengthening of the Hip and Core versus Knee Muscles for the Treatment of Patellofemoral Pain: A Multicenter, Randomized Controlled Trial. **J Athletic Training**. 2014; 49(3). DOI:10.4085/1062-6050-49.3.70.

INTRA-ARTICULAR PLATELET RICH PLASMA AND ROTATOR CUFF REPAIR OUTCOME

Studies reporting the effects of platelet rich plasma (PRP) on rotator cuff repair have produced inconsistent results. This study evaluated functional outcomes of patients receiving intraoperative PRP injection during the repair of supraspinatus tears.

Fifty-four subjects with MRI evidence of complete supraspinatus tears were studied. The subjects were randomized to receive either the standard of care or the standard of care plus PRP injections. At surgery, blood was collected immediately after anesthesia, with PRP retrieved for injection to the intra-articular space after the repair procedure.

All participants followed identical rehabilitation protocols, including shoulder immobilization for six weeks, passive exercise after three weeks and active exercise after six weeks. Muscle strengthening began after 12 weeks. The subjects were evaluated at three, six, 12 and 24 months using the UCLA and Constant Shoulder scales for function, as well as the Visual Analogue Scale (VAS) for pain, and evaluations for repeat tears by MRI.

All patients improved in pain (VAS) and function (UCLA and Constant scales) compared with baseline ($p<0.001$). Significant improvement in favor of the PRP group was noted at 12 months, as measured by UCLA scores, although that benefit was not evident on follow- up at 24 months. MRI follow-up demonstrated a single, complete tear in the control group.

Conclusion: This blinded, randomized trial of patients with complete supraspinatus tears did not find that a platelet rich plasma injection at the time of surgery would improve long-term functional outcome.

Malavolta, E., et al. Platelet Rich Plasma and Rotator Cuff Repair: A Prospective, Randomized Study. **Amer J Sports Medicine.** 2014, October: 42(10): 2446-2454.

LASER VERSUS ULTRASOUND FOR SUBACROMIAL IMPINGEMENT

One of the most frequent causes of shoulder pain is subacromial impingement syndrome. Previous data have shown conflicting results concerning the effects of low level laser therapy. This study compared the effects of low level laser therapy with those of ultrasound for the treatment of patients with subacromial impingement.

Thirty-one patients diagnosed with subacromial impingement syndrome agreed to participate in this study. Of these, 16 were assigned to a low level laser therapy group, and 15 to an ultrasound therapy group. All subjects underwent 10 treatment sessions over a period of two consecutive weeks. The primary outcome measures were a visual analogue pain scale, the Shoulder Pain and Disability Index, patient satisfaction, and sleep interference scores.

Both groups were found to have significant reductions in pain scores, as well as in shoulder pain and disability index scores, at three months, with no significant difference between the two treatment groups. Further, no significant difference was seen between the two groups in patient satisfaction scores.

Conclusion: This study of patients with subacromial impingement syndrome found that both low level laser therapy and ultrasound therapy can be effective in treating pain, disability and sleep interference symptoms in this population.

Yavuz, F., et al. Low Level Laser Therapy versus Ultrasound Therapy in the Treatment of Subacromial Impingement Syndrome: A Randomized Clinical Trial. **J Back Musculoskel Rehab.** 2014, 27(3): 315-320.

LUMBOSACRAL ORTHOSES FOR THE MANAGEMENT OF BACK PAIN

Lumbosacral orthoses (LSO) are commonly used in the management of low back pain (LBP). Studies that evaluate clinical outcomes among patients wearing LSOs have not compared the efficacy of these orthoses by their stiffness properties. This study addressed short-term, clinical outcomes in patients with LBP, comparing an inextensible LSO (iLSO) with an extensible LSO (eLSO).

This randomized, clinical trial included 98 patients with LBP, randomized to receive either standard care alone, standard care with an eLSO or standard care with an iLSO. Participants were instructed to wear the orthoses daily, particularly during activities that were noted to aggravate symptoms. The primary outcome measure was the modified Oswestry Disability Index (ODI), with secondary outcomes including the Patient Specific Activity Scale, the Fear Avoidance Beliefs Questionnaire, for both work and physical activity, and levels of pain, assessed with a numerical pain rating scale.

The mean improvement in both the eLSO and iLSO treatment groups reached the predetermined minimal

clinically important difference, but the standard care group did not. A logistic model of success (>50% improvement) revealed that, compared to the standard care group, those in the iLSO group had 4.7 times higher odds, and those in the eLSO group had 3.0 times higher odds of success.

Conclusion: This study of patients with low back pain suggests that inextensible lumbosacral orthoses are superior to extensible lumbosacral orthoses in treating this complaint.

Morisette, D., et al. A Randomized, Clinical Trial Comparing Extensible and Inextensible Lumbosacral Orthoses and Standard Care Alone in the Management of Lower Back Pain. **Spine.** 2014, October; 39(21): 1733-1742.

MARIJUANA LAWS AND OPIOID OVERDOSE MORTALITY

The proportion of patients with noncancerous pain who receive opioid prescriptions has nearly doubled in the past decade. Parallel to this increase is a rise in deaths from opioid overdose. Little attention has been focused on how the availability of alternative non-opioid treatments may affect these rates. Given the increased legal availability of cannabis between 1999 and 2012, this study examined the relationship between the change in these laws and the incidence of opioid overdose deaths.

Three states had medical cannabis laws effective before 1999. Ten states implemented such laws between 1999 and 2010. For each year, the authors plotted the mean, age adjusted opioid analgesic overdose mortality rate, comparing states with versus those without such laws.

The adjusted model revealed that medical cannabis laws were associated with a 24.8% lower annual rate of analgesic overdose deaths, as compared to states without such laws. The association with lower rates of opioid analgesic overdose mortality strengthened in the years after passage.

Conclusion: This study provides evidence that medical cannabis laws are associated with reductions in opioid analgesic overdose mortality.

Bachhuber, M., et al. Medical Cannabis Laws and Opioid Analgesic Overdose Mortality in the United States, 1999-2010. **JAMA Intern Med**. 2014, October; 174 (10): 1668-1673.

MELATONIN AND DELIRIUM AMONG PATIENTS WITH HIP FRACTURE

Delirium in older patients is associated with a high risk of dementia. As previous studies of patients undergoing surgery have demonstrated that melatonin metabolism is disturbed after surgery, this study assessed the effects of melatonin on the incidence of delirium among elderly patients hospitalized after hip fracture.

This multicenter, double-blind, randomized, controlled trial included patients 65 years of age or older, admitted for treatment of a hip fracture. Patients with delirium or who were taking melatonin at the time of admission were excluded from the study. The participants were randomized to receive either melatonin 3 mg, or a placebo, on five, consecutive evenings. Functional status was documented with the Katz Index of Activities of Daily Living. Cognition was assessed with the Mini Mental State Examination. Primary caregivers completed an Informant Questionnaire on Cognitive Decline - short form. The primary outcome measure was delirium during the first eight days after initiation of study medication.

Three hundred seventy eight patients were consented and randomized to one of the study's groups. The subjects' overall, mean age was 84 years, with 63% living at home before admission. The rates of delirium were 29.6% in the melatonin group and 25.5% in the placebo group (p=0.4). A smaller proportion of patients in the melatonin group experienced delirium lasting more than two days, as compared with those in the placebo group (p=0.02).

Conclusion: This study of elderly patients admitted for acute hip fracture found no evidence that melatonin reduces the incidence of delirium.

De Jonghe, A., et al. Effect of Melatonin on Incidence of Delirium among Patients with Hip Fracture: A Multicenter, Double-Blind, Randomized, Controlled Trial. **CMAJ**. 2014, October 7; 186(14): E547- E556.

MULLIGAN'S TAPING FOR ANKLE INSTABILITY

After ankle sprain, patients may experience re-sprain and the potential for subsequent development of chronic ankle instability. One of the most popular methods of supporting the ankle after ankle sprain is taping, both to prevent further sprains by external support and to enhance proprioceptive activity. This study examined whether fibula repositioning taping (Mulligan's taping) affects postural control in professional athletes with chronic ankle instability. Participants were 16 professional athletes with chronic ankle instability and 16 matched athletes without ankle instability. The subjects were screened using two questionnaires adapted from the Foot and Ankle Disability Index and the Foot and Ankle Disability Index-Sports. All participants performed a postural control test with and without taping. Pre- and post-taping, both groups performed the star excursion balance test, which incorporates single-leg stance on one leg with maximal reach of the opposite leg. The chronic ankle instability group performed the star excursion balance test standing on the injured leg.

Before taping, greater reaching distance was found in all directions for healthy athletes than for those with chronic ankle instability. After taping, there was a significant increase in reaching distance for the medial, anteromedial, posteromedial, and overall reach. Such significant improvements were also found in the healthy athletes, with the exception of the anteromedial direction.

Conclusion: This study found that Mulligan's Fibula Repositioning Taping can significantly improve postural control of athletes with chronic ankle instability. Improvements were also noted in healthy controls.

Someeh, M., et al. Immediate Effects of Mulligan's Fibula Repositioning

Taping on Postural Control in Athletes with and without Chronic Ankle Instability. **Physical Ther in Sport**. 2014; DOI: 10.1016/ j.ptsp.2014.08.003

MUSCLE INTRUSION INTO THE CARPAL TUNNEL

Carpal tunnel syndrome (CTS) is a common condition affecting 2.7% of the population in the United States. Previous studies have demonstrated that many individuals have muscles, either flexor digitorum or lumbricals, entering the carpal tunnel with certain finger and wrist movements. This study investigated whether increased pressure within the carpal tunnel may be associated with repetitive muscle intrusions into the tunnel.

Participants were self-identified as Latinos working full-time in manual labor positions. A total of 513 underwent ultrasound and nerve conduction studies. At the ultrasound screening, a cross-sectional area of the muscles entering the carpal tunnel was measured at the level of the distal wrist crease. US was used to determine the extent of muscle intrusion into the tunnel, with the wrist at full flexion and full extension. Of the 513 participants, 264 were identified as not having CTS at baseline in either hand, and were invited to return one year later. Of those, 173 returned for follow-up.

After controlling for age, gender and body mass index, four wrist variables differed between those with no CTS, possible CTS and CTS. These factors included nerve area (p=0.001), muscle area with the wrist in neutral position (p=0.017), muscle area with the wrist in flexed position (p= 0.020) and any muscle in the tunnel (p=0.003). However, after controlling for participant characteristics, none of the baseline ultrasound measurements of muscle predicted the development of CTS.

Conclusion: This study found that, while muscle intrusion into the carpal tunnel is associated with carpal tunnel syndrome, muscle intrusion alone does not predict the development of CTS.

Cartwright, M., et al. Muscle Intrusion as a Potential Cause of Carpal Tunnel Syndrome. Muscle Nerve. 2014, October; 50(4): 517 - 522.

NEAR INFRARED LIGHT AFTER RESISTANCE EXERCISE

Near infrared light has shown promise as a therapeutic modality for treating acute and chronic musculoskeletal injuries. This study evaluated the ergogenic effect of near infrared light therapy to attenuate strength loss after resistance training. Thirty-one, healthy men and women underwent measurements of range of motion, muscle point tenderness and muscle strength. Before exercise, those in the laser group received a dose of 360 J covering 15 points oriented along the biceps brachialis muscle, administered for three to four seconds to each point. The subjects thenunderwent elbow flexor resistance exercising, including maximal concentric and eccentric contractions. Immediately after exercise, strength was reassessed to determine the percentage decline from beginning to end of the exercise protocol. The participants were again assessed after two days for recovery, and returned at one week for the crossover procedure.

Muscle strength declined by 56.48% in the active group and 60.75% in the control group (p=0.05). After two days, no difference was seen in muscle point tenderness or range of motion, including pain-free flexion, full extension, pain-free extension and resting arm angle.

Conclusion: This study of 39, healthy adults found that near infrared light therapy can attenuate strength loss after resistance exercise.

Larkin-Kaiser, K., et al. Near Infrared Light Therapy to Attenuate Strength Loss after Strenuous Resistance Exercise. **J Athletic Training.** 2014; 49(3): doi:10.4085/ 1062-6050 49.3.82

NERVE INJURIES ASSOCIATED WITH ACETABULAR FRACTURES

Acetabular fractures are frequently associated with nerve injuries. These commonly include the obturator, femoral and lateral femoral cutaneous nerves, as well as the sciatic nerve. However, few studies have documented the incidence of these injuries. This retrospective investigation was designed to determine the proportion of patients with acetabular fracture who develop nerve injuries, and what factors might increase this risk.

Data were collected from the German Multicenter Pelvic Study Group, with documentation of pelvic fractures beginning in 1991 at 29 university major trauma hospitals. The registry data included type of acetabular fracture, injury patterns and injury severity, as well as demographic information and type of surgery. Data were also gathered concerning the neurologic status of the patient at admission and discharge, and included nerve injuries identified at the hospital.

Of the 2,073 patients identified, 1,395 underwent surgery. The proportion of patients diagnosed with targeted nerve injuries at hospital admission was four percent, and at discharge was seven percent. Type C fractures were associated with the highest proportion of nerve injuries while type A fractures had the lowest. By fracture location, transverse plus posterior wall fracture was associated with the highest, while anterior wall fractures with the lowest risk of nerve injury.

Conclusion: This study of patients with acetabular fractures found that, at hospital discharge, seven percent had a trauma related nerve injury, with the risk highest among those with posterior wall fractures of the pelvic ring.

Lehmann, W., et al. What Is the Frequency of Nerve Injuries Associated with Acetabular Fractures? **Clin Orthop Relat Res.** 2014, November; 472: 3395-3403.

PALISADE SACROILIAC RADIOFREQUENCY NEUROTOMY FOR ANKYLOSING SPONDYLITIS

Ankylosing spondylitis (AS) frequently causes sacroiliac (SI) joint pain. Intra-articular injections have been found to reduce pain and improve joint activity, with relief typically limited in duration. This

study compared the efficacy and safety of palisade SI joint radiofrequency neurotomy (PSRN) and celecoxib for the treatment of this disease.

Subjects with AS and SI joint pain were 155 patients who met the inclusion criteria and were randomized to receive either celecoxib at 400 mg per day for 24 weeks or PSRN. The primary outcome measures were pain intensities at 12 and 24 weeks, based upon a visual analogue pain scale. Disease activity, functional capacity, mobility capacity and adverse events were assessed with the Ankylosing Spondylitis Disease Activity Score (ASDAS), the Bath Ankylosing Spondylitis Metrology Index, and the Bath Ankylosing Spondylitis Functional Index.

Both interventions resulted in significant improvement in global pain intensity at 12 and 24 weeks. Reduction in adjusted global pain intensity was more robust in the PSRN group than in the celecoxib group at both 12 and 24 weeks ($p<0.0001$). Improvement was also more significant in patients receiving PSRN for total and nocturnal back pain. The two arms did not differ in the proportion of patients who achieved 20% improvement from baseline and ASDAS scores at either 12 or 24 weeks.

Conclusion: This study of patients with ankylosing spondylitis related sacroiliac joint pain found that radiofrequency neurotomy is superior to celecoxib for pain control, functional status improvement and spine mobility.

Zheng, Y., et al. Tomography Guided Palisade Sacroiliac Joint Radiofrequency Neurotomy versus Celecoxib for Ankylosing Spondylitis: An Open Label, Randomized and Controlled Trial. **Rheum Intern.** 2014, September; 34(9): 1195-1202.

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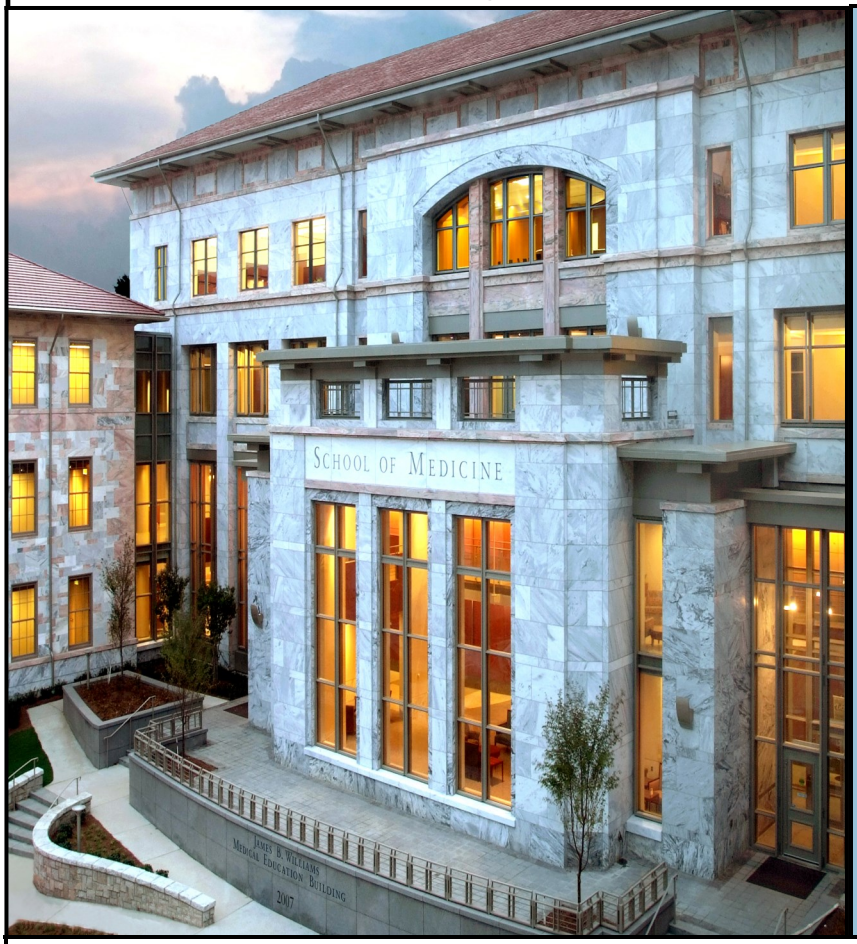

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